

THESIS.

Dysentery in the field, its diagnosis and  
treatment with special reference to use of anti-  
dysenteric serum in Bacillary Cases.

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by

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## I N T R O D U C T I O N .

Dysentery was responsible for a great deal of sickness and invaliding amongst our troops in the field during the Great War. In the eastern theatre of the war the number of casualties in the field which were attributable to this disease was exceedingly high. The disease soon claimed the attention of many observers in the field to its importance. The writer was one of the first few doctors to be mobilized from India and have had opportunities of studying the disease extended well over five years in the field, first as a Medical Officer of an infantry unit in France and Egypt, then with a Field Ambulance in Mesopotamia and Egypt and lastly as medical officer in charge of the medical division of a big base hospital at Cairo. During the period one saw the disease in its various phases. The disease was by no means new to the writer as one had some previous experience of the disease, extending over several years service in India. Owing to the prevailing conditions in the field there were certain phases which were quite new and called for attention, new aetiological factors had to be considered, confusion as to the exact nature and type/

type most prevalent in certain places and certain seasons had to be cleared up, difficulties of exact diagnosis had to be gauged and scientific treatment under field conditions had to be adopted.

Dysentery in its amoebic form is notoriously endemic in tropical and sub-tropical countries. It occurs throughout India, Egypt, Syria, Palestine and Mesopotamia. The bacillary form is well known to be of universal distribution. A few remarks as to climate and general considerations may help to understand prevailing conditions in the countries in which the eastern campaign was fought and where the dysentery was prevalent during the war.

Egypt is a very hot and dry place with scarcely any rain. The place has a low degree of humidity except near the Mediterranean coast where humidity is much greater owing to the moisture laden northerly wind. Water supply of the most part of the country is from the sweet water canals taken off the river Nile. Sweet water canals are always being contaminated by local inhabitants.

Between Palestine and Egypt there is a sandy desert through which old Caravan route traverses. There are a few brackish wells in the Oasis but water for the troops had to be obtained from Portsaid through laid down/



down pipes. During the summer months days are hot but nights are always cold. There are frequent sand storms during hot months.

Palestine belongs to sub-tropical zone and Jordon Valley is tropical - very unhealthy and malarious. Water for domestic use in Palestine is rain water and is stored in cisterns. The cistern water is liable to pollution and contamination. For troops water supply was from the streams and in the hills from the springs. Both of these sources were open to gross contamination from the neighbouring villages of the inhabitants.

Mesopotamia is a flat featureless land and for miles without any vegetation. The place is very hot, dry and dusty during summer months. The first quarter of the year is a rainy quarter. During the whole of this time the river Tigris is rising and continues to rise till the middle of May. After this month it begins to fall reaching its lowest level about October. The temperature is never very high during the day during these three months. The average daily maximum being about 70-F. Nights are very cold, thermometer often dropping to much below 40-F. The third quarter is unpleasantly hot. In July the average daily temperature under the shade being about 110-F. On many days it reaches 119-F or even higher. The/



The second quarter is cooking up for it. The fourth quarter like the first is pleasant but is much less rainy. Flies begin to multiply in March and become a great pest in April and May. They disappear in hot weather appearing again in autumn. The water supply for the troops was from the river Tigris. In early parts of the campaign it was often impure raw water direct from the river, as no adequate means for the purification and storage of the drinking water existed. Later on all drinking water was purified by chlorine.

Seasonal prevalence of dysentery in the field:-

We reinforced our troops in Mesopotamia in early part of the year 1916. In that year dysentery was probably the most prevalent disease with us throughout the year but in certain seasons it assumed epidemic form, its prevalence would increase rapidly reaching its maximum level in a few weeks and then decline. The minimum incidence of the disease was in February and March, with April started the spring epidemic in the month of May. With the coming of extreme heat in June and July cases rapidly fell and in the third quarter of the year generally remained at the level of the April incidence, rising again in October and reaching their maximum level in November and then falling gradually to their minimal incidence in February.

(1) Lendingham worked out the incidences of dysentery per 10,000 combined British and Indian troops throughout the area from 1916 to December 1918. The following figures taken from him show the incidence variations in British and Indian troops:-

Minimal incidence in British (February)	10.9 per 10,000
" " " Indians " "	5.6 per 10,000
Maximal " " " Spring outbreak in British (May)	59.6 per 10,000
" " " Spring outbreak in Indians (May)	17.2 per 10,000
" " " Autumn outbreak in British (Nov.)	85.3 per 10,000
" " " Autumn outbreak in Indians (Nov.)	21.9 per 10,000

In addition to the seasonal variation another point would be noticeable from the above figures, that the incidence of dysentery in Mesopotamia<sup>was</sup> invariably greater in British than in Indian troops.

In Egypt and Palestine epidemic dysentery showed a definite seasonal incidence too, where the epidemic form occurred in late summer and early autumn.

Nature of the dysentery most prevalent in the field:-

Two main causes of dysentery in the field were *E. histolytica* and *B. Dysenteriae*. They produced a good deal of sickness in the field and it became of importance/



importance to know what part each played in the spring and autumn epidemics. A Considerable attention was devoted to this point by workers in the various theatres of the war. We had a big outbreak in Dardanelles in 1915 and some observers believed that epidemic at Gallipole was due to *E. histolytica*, others equally keen observers blamed *B. Dysenteriae* mainly for the outbreak. (2) Cowan and Miller were of the opinion that "at Cape Helles amoebic dysentery was rife during July, August, September and October, 1915. While at Suvla Bay the main cause was bacterial." There is no doubt that in that epidemic both agents played a part but by far the major portion of the dysentery in that sphere was of bacillary origin. This view was substantiated by subsequent investigators in 1916. In the earlier part of the war the confusion as to the relative incidence of the two forms of the disease were easily explainable. In a case of acute dysentery roll of *E. histolytica* if any can be easily defined. It is easy to recognise *E. histolytica* in fresh blood and mucous stools. In the early days of the untreated cases of the disease *E. histolytica* can be easily demonstrated microscopically in about 90% of the cases, and in the later stages presence or absence of characteristic cysts helps in the diagnosis. It is not so easy with *B. dysentery*. The isolation of/



of the bacilli is not so easy, technical work involved in the isolation of the causal organism is not so simple as the microscopic detection of *E. Histolytica*. For the successful isolation of the bacilli sample should be obtained at the earliest period of the disease. This was often not feasible under the field conditions. After the third day of the disease it was often impossible to isolate the causal organism. To overcome these difficulties provision of good front line ward laboratories with skilled bacteriologist had to be made. It took some time to have these arrangements completed. Under these circumstances a case of *B. dysenteriae* occurring in the front line could not be bacteriologically diagnosed by the time he got to a base hospital. At the central laboratory, Alexandria, in over half of the cases with blood and mucus in the stools no dysentery bacilli or entamoeba were detected, and the cause of the illness remained undetermined, while investigating cases near the front line before the third day of the disease, (3) Bahr found that the percentage of successful isolations was 78%. In a field laboratory in Palestine in 1918 out of 1814 cases examined 7% were amoebic and 93% bacillary. The opinion was prevalent in Mesopotamia amongst workers in the field that in an epidemic season practically all the cases in which amoeba could not be demonstrated may fairly accurately be regarded as bacillary. In the/

the last quarter of 1917 average incidence of dysentery cases per 10,000 was 83.3, of these amoebic general incidence per 10,000 was 22% and the figures in fourth quarter of 1918 were 73.03 and 16.6 (Lendingham.)

(4) Boney and others while working at a base laboratory in Mesopotamia examined 309 cases of acute dysentery with blood and mucus with the following results:-

Microscopic examination,

*E. histolytica* 80 = 26%

of the remaining 209 plated,

<i>B. dysenteriae</i>		
Shiga	65	) 108
Flexner	38	
Shiga, "	5	
Negative		101

that is 51.7% were proved to be due to infection by *B. dysenteriae* and the relative incidence of the two forms of the disease will be amoebic 26% and bacillary 35% of the total number of the cases examined. From an examination of the above figures the medical advisory Committee reported as follows:-

"It is thus apparent that bacillary dysentery is the prominent type in the Mesopotamian area (as in other war areas) and there is little doubt that had the cases investigated been in the main local admissions/



admissions instead of transfers from up river the proportion of bacteriologically proved bacillary cases would have been still higher."

My own experience while working at the laboratory attached to my division of the base hospital at Cairo tallies with the above conclusions. A detail of the statistics of my own cases will be found under the heading of treatment of dysentery in the field. In Egypt and Palestine bacillary variety contributed over 90% of the cases of dysentery. It was by far the most prevalent variety of the disease in that sphere of the war too.

Principal factors in the transmission of the disease in the field:-

The disease is spread in the field by many agents. The conditions in the field are different to conditions prevailing in the civil life. Rigors of field life, exposure to wet and cold, unsuitable, badly cooked and monotonous food, privations under siege and retreat conditions, general insanitary condition of camp life, flies, dust-storms, contaminated water and promiscuous association with carriers of the disease in camps all are recognised factors which aid in the spread of the disease in the field. These factors play an undeniable part/



part but the role played by water is unrivalled by any of these agents. Dried up faecal matter from dysentery patients and disease producing cysts readily get in to unprotected water supply and contaminate it and spread the disease. Time out of numbers infection in the field has been directly traceable to the water agency.

In 1913 at Secunderabad a small epidemic of amoebic dysentery investigated by the writer proved to be solely attributable to use of contaminated water. The writer was then in charge of the district laboratory and had to satisfy himself with the safety of water for the troops in a certain area where the troops had to go out for a fortnight camp of manoeuvres in November. The water supply was from shallow wells. Most of the wells were not more than ten feet deep and were within easy distance of inhabited farms. The wells were personally inspected, water samples taken, chemically and bacteriologically analysed and those found fit for drinking purposes were marked with distinctive flags. On the last day of the fortnight camp of manoeuvres, two brigades of troops took part in the fight and all troops returned home without any untoward incidence. On the third day of the return from camp, men from the regiment to which the writer was attached as a medical officer started reporting sick/

sick for dysentery. In two days sixty men out of a double company of about 200 reported sick for the disease. The disease was of the mild nature, they all passed blood and mucous, and on microscopic examination *E. histolytica* was easily detected in the bloody discharges. They all reacted to emetine and within a few days were all well without any complications. The disease was limited to one company only and was evidently due to an infection which they had recently picked up at some place. On enquiry it came out that on the last day of the camp they had all drunk water from a certain well in the area. The writer next day revisited the place of the camp with a guide, he recognised the well, it turned out to be one the water of which had not been passed fit for drinking purposes and it had been discarded on account of its disused appearance and presence of moss and greenish looking water in it. Sample from this well was examined again and was found to contain cysts of amoeba, vegetable matter and various other low organisms. The outbreak of dysentery epidemic was evidently due to drinking of contaminated water from this well.

In 1916 in Mesopotamia most of the sickness in the field was due to dysentery. Our troops were besieged/



besieged in Kut and we had to reinforce them in hurry. Drinking water for the troops was from river Tigris, raw impure water full of contamination and faecal matter which are habitually thrown into the river by the inhabitants. We had hardly any means at our disposal in those days to purify water on a large scale and most of the troops had to drink this water in its natural state, with the result that dysentery was rife amongst them. Soon the trench warfare started and we got fixed to trenches and camps, means of water purifications were designed and disease brought under control to a great extent. The Turks shifted from their trenches and moved back for a couple of miles in the beginning of May, 1916. We had to advance into the territory left foully contaminated by the Turks, some troops took water from a contaminated stream in this area with the result that we had to face Cholera and epidemic of dysentery, proving once more that Cholera and Dysentery are often associated and are caused by drinking of contaminated water. Many observers in the field have remarked that bacillary dysentery while pre-eminently is a disease of the standing camp where the ground becomes contaminated, amoebic dysentery is a disease of the marching army and takes on an epidemic form, on advancing well into a new territory where water supply is/



is not above suspicion and often grossly contaminated. These observations were confirmed on the Palestine front where the Turks were smashed up in September 1918 and on their retreat we had to advance into the new territory. The incidence of dysentery in our troops rose accordingly.

Effects of prevalence of flies on the prevalence of dysentery in the field:-

Various observers in the eastern theatre of the war had laid stress on the point that flies were potent factors in the transmission of dysentery. It is noteworthy that at the height of the prevalence of flies in the field, the incidence of dysentery cases was at their maximum in Mesopotamia. We had seasonal incidence of two epidemics of dysentery and this coincided with maximum prevalence of flies in the field. First quarter of the year in Mesopotamia, is cold and free from flies. During this quarter our number of dysentery cases was the least. Flies began to appear in March and were at their greatest height at the end of April and beginning of May, which coincided with spring epidemic of dysentery. With the hot weather flies disappeared and there was a corresponding fall in the disease, though the disease remained/

remained at a pretty high level in this quarter owing to the other factors. Flies reappeared again in September and October and the autumnal fly prevalence was at its maximum in November which period coincided with the autumnal epidemic of dysentery. From this it would appear that in Mesopotamia dysentery was most prevalent in spring and autumn when flies were most numerous there.

(5) Buxton by dissection of 1027 flies in Mesopotamia arrived at the conclusions that 63% of them contained apparent faeces, .3% *E.histolytica* cysts and 4.09% had an intestinal parasite and he was of the opinion that the fly in Mesopotamia was a great factor in the carriage of bowel disease.

Flies were believed to be potent factors in the spread of bacillary dysentery in the Egyptian theatre of war. House fly has been incriminated for being capable of carrying both Shiga and Flexner organisms. Bahr and other workers in the Palestine front were able to isolate Shiga and other organism from the intestinal tract of wild flies caught in the desert. On the other hand, Wenyon and Osconer (6) while working in Egypt demonstrated that amoebic cysts including those of *E.histolytica* can pass successfully through the alimentary canal of house flies, to be voided in the faeces where these may be deposited and they also found cysts/

cysts in the intestines of caught wild flies. They along with others believed that the part played by the flies in the transmission of amoebic dysentery was by no means a small one. It is a controversial point whether the fly is or is not such an important vehicle in the transmission of amoebic dysentery as it is in the case of bacillary infection. Flies may successfully transmit amoebic cysts but water remains a far more important vehicle of transmission of amoebic infection in the field.

#### Diagnosis of dysentery in the field:-

In the earlier years of the war there existed much confusion in the minds of observers in the field as to the exact nature of disease characterized by symptoms of tenesmus and passage of frequent stools with blood and mucus. The diagnosis of the disease was beset with many difficulties.

Those of us who had prewar Indian experience were enough familiar with the amoebic cases (most common variety in India) but the presence of bacillary type on a large scale at which it occurred in the field was little appreciated. In the early years of the war most of the medical officers had very little previous experience of tropical diseases. The dysentery was a/



a new disease to them and it was little understood by majority of them. There were very few well equipped laboratories in the field and those who were engaged in the bacteriological diagnosis of the disease have had not the requisite experience for this kind of work. For want of proper laboratory facilities a large majority of the cases had to be diagnosed clinically. Even when properly equipped laboratories came into existence in the field. Often they were located at a distance which precluded them from being of much aid in the diagnosis of front line cases. By the time a patient could reach them either he was dead or convalescent after treatment to the extent that no casual organisms could be demonstrated from his faeces. It was soon realized that ultimate diagnosis of the case suffering from this disease rests with the bacteriologist and for want of proper laboratory facilities at least in the early part of the war. A large majority of the cases with blood and mucus in their stools had to be diagnosed clinically. Under these circumstances the true nature of the infection often remained obscure. There were two forms of the disease prevalent in the field and clinically in some cases the symptoms of both forms were alike and hardly distinguishable.

The diagnosis of amoebic dysentery was often difficult. Generally the onset of the amoebic form of/  
of/

of the disease was insidious or subacute. Fever was often absent or present in a slight degree 100 F. or so and that even for a day or two there were no toxic symptoms such as headache, malaise, prostration etc. But in some cases especially where there was additional bacillary infection the fever was high and general symptoms were severe. The stools in amoebic cases were frequent, scanty, blood and mucus intermingled with faeces. An accurate diagnosis of the disease was only possible by microscopic examination of the faeces. For the successful demonstration of amoeba, examination of faeces should be done early and faeces should be fresh, as cold and prolonged exposure of faeces to atmosphere destroys amoeba. The faeces should not have been mixed with urine as this procedure destroys amoeba readily. As emetine kills the amoeba, a specimen should be taken before the start of the treatment. In fresh stools active *E. histolytica* containing ingested red cells could be readily demonstrated. If the *E. amoeba* in its vegetative form was not detected at the first examination, the examination was repeated once or twice as a single negative examination is often of little value. By careful examination in fresh stools amoeba in vegetative forms had been demonstrated in 90% of cases.

Where/



Where the microscopic examination was not available diagnosis had to be made from general run of the symptoms. History of previous attacks of the disease, hepatitis, sources of infection, nature of the most prevalent type of the disease at the time and reaction to emetine etc. etc.

Macroscopic examination of the faeces may be of some use, generally in amoebic cases. Evacuations are small, blood and mucus are intimately mingled with faeces. It may not be of any help, for in the amoebic infection any type of stools may be present, the real test always being the presence of *E. amoeba histolytica*.

Diagnosis of a bacillary infection under field conditions is by no means an easy thing. This form of the infection has always been common amongst the armies and during the great war great preponderance of the cases of dysentery belonged to this type. Clinically we saw cases which were hardly distinguishable from the amoebic form. They were of all degree of severity, mild with but a few evacuations and no constitutional symptoms, of average severity with frequent bloody evacuations, rise of temperature and cases of great severity some exhibiting marked prostration, symptoms of toxemia and dehydration resembling cholera in their general effects on the constitution of those suffering from/



from the disease. In a typical case the onset was generally abrupt, the patient was suddenly taken ill and in a few hours he was passing pure blood and mucous motions, he complained of griping pain and tenderness of abdomen. Tenesmus was extreme. There was added to these symptoms a temperature from 101 to 102. Tongue was furred, skin hot, pulse frequent and bounding and patients looked ill and complained of headache and anorexia. The disease is very exhausting and on the second or third day the patient's appearance is often characteristic, face is flushed and eyes are languid, he is indifferent to his surroundings, is exhausted but has not got apathetic and dull look as in enteric fever. Pain, sleeplessness and starvation increase his exhaustion. In cases that are likely to do well, diarrhoea lessens and fever ceases in 48 hours, in some the fever may go on for a week or so and blood and pus may continue in the stools ultimately settling down and ending in recovery, others with very toxic symptoms showing no improvement in their condition and ending in death. There is often no difficulty in diagnosing these cases as of bacterial origin. However some severe amoebic cases may present symptoms so similar to a bacillary case as to be undistinguishable from it without a microscopic examination and demonstration of active *E. histolytica*.

In an epidemic of dysentery number of cases coming/

coming from the same camp with high fever frequent bloody motions and toxic symptoms point to the bacterial infection.

Macroscopic examination of the stools as an aid to diagnosis:-

Character of the stools may be of some help in the diagnosis of a case. Various observers in the field have described general features of the stools in two forms of the disease and have claimed that some distinction can be made out between stools of the two forms of the disease. It is claimed that acute bacillary stools are fluid purulent, pure blood and mucus or mucus tinged with bright red mucus, viscid, adhering to the bottom of the pan while acute amoebic stools are scanty, blood and mucus intermingled with faeces; they may be fluid mucus. Blood is dark red occurring in streaks or clots.

These features may be of some use but experience soon taught that no absolute reliance could be placed on such distinction as every type of stool may be present in amoebic or bacillary cases.

Importance of clinical study in the field:-

The great majority of cases occurred in front line where/



where no bacteriological or microscopic examinations were available and early recognition of the true nature of the disease from treatment point of view was of utmost importance. While in medical charge of a regiment or with an ambulance we had to depend a great deal upon the clinical features of a case and success in treatment depended on early diagnosis. Without some definite notion of the probable nature of the disease specific treatment by emetine or antidysenteric serum could not be given timely.

Value of laboratory methods as aids in diagnosis of the field dysentery:-

It was soon realized that the ultimate diagnosis of the true nature of a dysentery prevalent in the field rests with a bacteriologist. Under active service conditions, rapidity in work and speedy diagnosis was of utmost help to the clinician. The following procedure while working at laboratory attached to a base hospital, Cairo proved very satisfactory. The faeces of all dysentery cases were received in a pan free from cresol, after the macroscopic examination, sample transferred to the laboratory were examined within few hours. A portion of blood mucus was examined microscopically and search made for *E. histolytica*. In fresh stools and specially with the use/



use of hot stage *E.histolytica* if present could be easily detected, a specimen showing active *E.histolytica* containing ingested erythrocytes was declared positive. In cases of negative result examination was repeated on two or three occasions and amoebic cases generally proved positive for *E.histolytica* in about 90% cases. In bacillary cases the microscopic examination of fresh pure blood and mucus showed characteristic cellular exudate and absence of amoeba. In early stages of the disease a large number of undamaged polymorphs and macrophages 20-30u were seen. In addition to these there were red cells present. The macrophages are apparently derived from capillary endothelium, they may contain vacuoles, granules and even ingested red cells or leucocytes. These macrophages in great majority of the cases were considered as characteristic of the bacillary disease, though their presence in a limited number is not precluded in amoebic cases. On the discovery of cellular exudate in a specimen provisional diagnosis of bacillary dysentery could be given. This provisional diagnosis in early stages of the disease was of great value to clinicians in the treatment of a case. An attempt was made to confirm this provisional diagnosis of bacillary dysentery by plating a loopful of blood and mucus on six inches MacConkey plate. The writer found/

found a blunt glass rod very useful as a spreader. Two or three plates are smeared with one smear on the rod to get the colonies separated out. The plates were incubated for 24 hours at 37 degrees Centigrade and characteristic colonies were tested macroscopically against their hightitre specific serum on a clean glass slide. Successful colonies were grown on agar and then passed in sugars for their typical reaction. In this way provisional diagnosis could be confirmed in a day and whole process completed in three or four days.

Isolation of specific organisms of dysentery from faeces in the field is not an easy thing. The organisms are very delicate and under favourable circumstances are often difficult to isolate. Technique is a complicated one and in practiced hands often fails to give good results. For successful isolation of the organisms it is essential that (1) Specimen of blood and mucus should be fresh, in a few hours old specimen the organism is out grown by other faecal organisms. (2) Dejecta should be taken early in the disease, after third or fourth day of the disease, often the specific organism could not be isolated. (3) Fresh specimen of blood and mucus should remain free from contamination of urine, antiseptics etc. (4) One may fail to isolate organisms/



organisms even from a suitable stool at the first attempt. Examination must be repeated on more than one occasion in case of failure.

Type of specific organisms causing bacillary dysentery in the field:-

Most of the cases of the bacillary dysentery in the field were attributable to B.dysenteriae Shiga's and organisms of Flexner group (Flexner Bacilli and His and Russells Y Bacilli). Various other atypical strains of organisms (B.Coli, B.Faecalis alkaligenes etc.) have been isolated from stools of dysentery patients and have been believed to cause the disease. It is still a moot point what part these actually played in the outbreak of dysentery. Great majority of severe cases of bacillary dysentery are attributable to Shiga's bacillus, milder cases are due to Flexner group organisms. Of 201 isolations of specific bacilli in Egypt out of 342 specimens plated, 114 or 33.5% it was Shiga bacillus. 87 or 25% it was Flexner Y bacilli. In Mesopotamia of 718 isolations of B. dysenteriae, B.Shiga was in 45% and B.Flexner in 54.7%.

Treatment of dysentery in the field:-

Success of treatment in the field depends upon many/



many factors and foremost of them is the early diagnosis of the nature of the disease the patient is suffering from. Under active service conditions a patient's life depends upon early recognition of his condition and adequate diagnosis of the disease and its treatment at the earliest possible moment. The treatment under field conditions resolves itself into three headings:-

- (1) Complete rest.
- (2) Maintenance of the patient's strength by adequate diet.
- (3) Adoption of means to eliminate early from the system, casual organisms and the poisons elaborated by them, by use of drugs or by timely exhibition of a suitable antedote and thus render the diseased organs in such favourable conditions where they can heal themselves.

#### Value of Rest:-

The complete rest is of utmost importance, unfortunately under field conditions this is often impossible to procure and especially in the early days of the disease when it is most required. The patient often is taken ill in the first line trenches, once ill there is no place for him there and is hurried back the best way it can be done. The journey may be prolonged and troublesome, it may be days before he reaches a place of comparative ease. During the critical/

critical days of the disease it is not only the disease and its poisons that he has to cope with, but with the waning strength of the body he has to suffer hardships of a prolonged and troublesome journey.

On the first appearance of mucus and blood in the stools the patient should be at once sent to bed. The rest should be complete, under no circumstances he should be allowed to get out of bed. He must use bed-pan. Owing to frequency of motions nights are disturbed and there is restlessness. To promote sleep and rest during the night he should be given a dose of opium at bed time. This would insure some rest at night. When the patient is in transit from the front line <sup>to</sup> a c.c.s. a hypodermic injection or morphia would insure certain amount of comfort for him on the journey. Where there is much abdominal pain local applications to abdomen of hot water bottles etc. prove of comfort to the patient and promote rest.

#### Diet in dysentery:-

Treatment of dysentery should be conducted by condition of tongue, daily observations of the stools, and tenderness of the abdomen. The stools should be kept daily for inspection and every dysentery ward should have a wire cage where specimen can be kept free from flies. In the acute stages of the diseases quality of the diet is of utmost importance. Bowels are/



are in a state of open sores and nothing that could lead to their irritation must be allowed. Diet should be nourishing but one which does not leave much residue. Under field conditions the selection as to diet fulfilling these conditions is limited one. Milk especially the tinned variety available in the field is seldom well borne. In acute stages of the disease albumen water if eggs are available in the field may be given for a couple of days. Under active service conditions rice water proved itself an excellent diet in acute stages of dysentery and it was readily available in fresh condition.

Rice water has been used in India for dysentery with advantage. In the Mesopotamian campaign medical officers with the Indian experience of the disease gave it an extended trial and formed a very high opinion as to its nourishing, non-irritating, soothing and diuretic qualities. Rice was always available in the field, all that had to be done was to boil a little of it, strain it, serve rice water with salt to taste to dysentery patients while the grain could be utilized for the food of healthy individuals. Rice water could be given ad-lib, it allayed thirst, is nourishing, and being demulcent encouraged healing process and by its diuretic properties helped in elimination of toxin products through kidneys. Both Indian/



Indian and British troops readily took it and preferred it to tinned stuffs.

Brand's chicken essence in early stages of the disease is of great value, it is nourishing and relieves exhaustion and may be often used with advantage. In early stages of the disease there is a good deal of loss of tissue water, and fluid taken in any quantity is to the advantage of the patient. It dilutes the poisons circulating in the blood and helps in their elimination through the kidneys.

With improvement in the character of stools, tongue, the diet may be improved a little and such diets as Bengers food, beaten eggs, beef tea, etc. might be given with advantage. When convalescence sets in, the diet may be judiciously improved, no full hospital diet being allowed till the patient is free from diarrhoea, blood and mucus for some days, and no patient is to be allowed to go out to convalescent camp till he has been for a week on ordinary hospital diet.

#### Medicinal treatment:-

An initial dose of castor oil and opium has always proved of great benefit in the commencement of the disease. In addition to the specific treatment such as Emetine or serum which should be exhibited as/

as early as a diagnosis has been established, mag. sulph. in one drachm doses given every two hours undoubtedly helps to get rid of irritating material and may be continued with benefit till the stools are free from blood and mucus and faecal matter appears in the stools.

Use of opium in dysentery may have some influence in checking diarrhoea but its value as a promoter of some rest at night is undoubted and as such its value is recognised.

Where there is a very troublesome tenesmus a washout with a warm normal saline is very soothing.

In choleraic cases where there is extreme dehydration, use of hypertonic saline solution three or four pints intravenously have proved of utmost benefit and should always be given.

#### Treatment by antidysenteric serum and Emetine:-

While in charge of the medical division \_\_\_\_\_ Hospital at Cairo, 530 cases of dysentery were admitted into the dysentery wards of the hospital during the period between June 1918 to March 1919. Most of these cases had been taken ill in the field about a fortnight or so previous to their admission to this hospital and had had a course of treatment in the field ambulances and Casualty Clearing Stations. Very few/



few of the cases on their arrival were acutely ill. They were more or less convalescent or were suffering from relapses. Some acutely ill cases came from the Local Camps and supplied some fresh material for observation. A large majority of these, 530 cases presented symptoms of a bacillary infection. A few cases had been diagnosed and treated as cases of amoebic dysentery. A number of cases were infected as well with Malaria, enlarged spleen, Ankylostomia, Tetramitus, and Trichomonus etc. Stools from a good many of these cases that had passed through a C.C.S. had been examined at the field laboratories and no less than 101 cases out of these 530 cases had an account of the presence of red blood cells, pus cells, epithelial cells and macrophages in these stools been declared cytologically as bacillary dysentery. *Entamoeba histolytica* had been detected in nine cases. A few cases showed *Lamblia* and Flagellates. Three with intractable symptoms of diarrhoea showed *Balan-tidium Coli* in their stools. In the case of nil reports it is presumed that laboratory examinations had not been available or possible in the field and the symptoms had been interpreted clinically as of bacillary dysentery, a type most prevalent in this field.

Most of the cases were of moderate severity.  
About/



About 50 cases out of the 530 were of great severity. Death resulted in four cases.

### Bacillary Dysentery.

Most of the cases unmistakably were of bacillary type. Field laboratories had detected cellular exudate suggestive of bacillary infection in 101 cases out of the 530. Presence of amoeba in stools had been noted in nine cases only. A large majority of the cases with no laboratory reports or negative laboratory reports had been treated from the start as cases of Bacillary infection. On their arrival in Cairo, 441 cases with stools containing blood or mucus, or both, were examined microscopically by the Pathologist to the hospital. The same officer examined 454 cases of the same series passing stools with blood and mucus by bacteriological cultures. *Mobile E. histolytica* was present in 13 cases and cysts were present in 12 cases only. The clinical evidence in the rest of the cases was in favour of their being cases of Bacillary infection and causative organisms were isolated in 44 cases. 21 cases contained organisms of Flexner Y type and Shiga bacillus was found in 23 cases. In 16 cases other abnormal bacillary organisms were found. The/

The Pathologist was of opinion that the smallness of the number of \*\*\* positive findings is likely due to the facts (1) That few of the cases arrive here in the first days of the attack of dysentery, (2) That most of the typical and acute cases are diagnosed by laboratories in the field while a typical and sub-acute cases arrive here after some delay and may baffle efforts to find the causative organisms.

#### Treatment.

As the large majority of these cases were of mild type, they had responded well to medicinal treatment. Rest in bed, bland diet, a few doses of saline mixture cleared up these cases. Blood and mucus stopped, and the patients convalesced uninterruptedly. Most of the severe cases had been treated with polyvalent anti-dysenteric serum and the value of this form of treatment has evidently been well established. No less than 133 cases out of 530 cases were treated with antidysenteric serum, apparently with beneficial results. In some cases its action was remarkable. Twenty cases had received 20 c.c. serum in a single dose, seven had received 40 c.c. in two successive 20 c.c. doses, 30 cases had received 40 c.c. in a single dose. 22 had 60 c.c., 25 had 80 c.c., 10 had/

had 100 c.c., 2 had 120 c.c. in two 60 c.c. doses, 5 had 140 c.c. in 80 and 60 c.c. doses, 9 had 160 c.c. and 3 had over 200 c.c. A dose of 40 c.c. serum given subcutaneously was the popular dose in the L of C hospitals.

In our hands the serum, when given early, in doses of 60, or 80 c.c. repeated once or twice, has proved most effective. 33 cases received serum treatment in these doses in the base hospital. Most of these 33 cases were either bacteriologically positive for Shiga or Flexner bacilli, or were clinically cases of a severe bacillary infection and needed serum therapy. The relief of the patient after the injection of the serum, was generally immediate. The number of stools lessened, mucus and blood began to disappear and the general comfort of the patient began to be evident. A man belonging to the first Kashmir Rifles was admitted into the hospital on 1.1.19 suffering from dysentery. On 2.1.1919 he was passing frequent fluid stools, mostly composed of blood and mucus. On the 2.1.19 80 c.c. of antidysenteric serum was given subcutaneously with immediate relief of the symptoms. Laboratory reports declared his faeces positive for Shiga bacilli on 5.1.1919. Another dose of 80 c.c. was given subcutaneously on the 6.1.1919. He passed stools mixed with some mucus. On the 9th he had slight oedema of hands, feet and legs, and on chest patches of raised rash appeared. These were no doubt due to serum. These soon disappeared and the man rapidly improved.

By/



By the 19th his stools were normal, and he had completely recovered. He was discharged fit on 21.1.1919.

Another relapse case, positive for Shiga bacilli improved rapidly under this treatment. A man belonging to the 28th Punjabis took ill on 22.12.18, his stools were blood and mucus only and on the day of the onset of the disease, his temperature was 100-F. In the ambulance he was treated with castor oil and Tinct. Opii. On 2.1.19 there was no blood or mucus. On 25th he passed mucus and blood again, on 26th he was given Bismuth and Salol. On 29th he passed slight blood, and on this date he was transferred to c.c.s. On 2.1.19 he was admitted to the hospital, on the 5th his stools were yellowish fluid, on the 9th they were normal. On the 13th, stools dark brown fluid with floating lumps of mucus. On the 15th, stools in small quantity, all blood and mucus. Laboratory report positive for Shiga bacilli. On 15.1.1919, 80 c.c. antidysenteric serum, was given subcutaneously. On the 17th, stools dark brown, and two lumps of mucus and small clots. On the 18th a second dose of 80 c.c. antidysenteric serum was given. On the 20th the stools were dark brown fluid, free from blood or mucus. By the 25th he was well again and his general condition was noted as good.

The cases of Flexner Y group infection responded equally/

equally well to the serum treatment.

A man belonging to the 47th Sikhs Regiment was admitted on 3.12.1918 suffering from Influenza. His blood was negative for Malarial parasites. On the 6th he passed frequent motions with blood and mucus. Laboratory report on the faeces was positive for *Bacillus Dysenteriae Flexner's* and negative to amoeba. He received 60 c.c. antidysenteric serum subcutaneously on the 14.12.1918. By the 17th his stools were normal and he was discharged fit for duty on 22.12.18.

Another man suffering from Bacillary dysentery was admitted on 15.11.1918, on the 16th his stools were only mucus and blood. The same day antidysenteric serum in 40 c.c. dose was given to him subcutaneously. On 18.11.18, stools only mucus, slightly blood stained, positive for *Flexner's* on this date. On the 19th stools were in the same condition as on the 18th. On the 24th stools semiformal, brown-yellow, normal. On the 25th stools semiformal, dark, normal.

Most of the bacillary cases when treated early with serum responded to it.

Major \_\_\_\_\_ who was for a long time in charge of dysentery wards of this hospital had treated bacillary cases with polyvalent antidysenteric serum with apparent success. Only one of his cases did not respond to this antidysenteric serum, though the serum was given on three successive days in 80, 80, and 40 c.c. doses. This was a case which was admitted on 10th October, 1918/



1918. On the 11th he had a griping pain and was passing motions with blood and mucus. Had eleven motions between 12 noon and 3 p.m. 80 c.c. antidysenteric serum were given, no improvement occurred. Two more doses of serum in 80 and 40 c.c. doses were given without much relief. In this case according to the laboratory report the disease was due to Hiss and Russell bacilli, which had been isolated from his stools. This man ultimately cleared up under medicinal treatment and his stools became normal by 5.12.18. He was discharged fit for duty in 58 days.

Of the four cases of dysentery that died in the hospital, two had not been treated with serum at all and the other two cases evidently of very severe type, were complicated by the presence of another serious disease and the serum could not cope with the disease. One of these cases had been admitted from Broncho-Pneumonia on 1.11.1918. On 19.11.18 he developed dysentery and after an illness of one month and 17 days, died on 17.12.1918. He had not been treated with antidysenteric serum. The second man who died of dysentery started with his illness on 14.10.1918, temperature 102-F, frequent watery stools with much blood, incontinence of faeces, pulse feeble. His condition became worse rapidly, and he died on the 19th. This man did not receive any serum. The third case who died had started his disease with an attack of influenza on 4th December, 1918, on examination he had fever, headache, cough, rales and rhonchi on/



on both bases of his lungs. On the 7th he developed dysentery and was passing very frequent motions with blood. On the 8th he had antidysenteric serum 60 c.c., subcutaneously, without much improvement, on the same day 15 grs. Quinine was injected subcutaneously, and on the 9th another 15 grs. of Quinine was injected. Motions were still frequent, but had no blood. On the 10th his pulse was very feeble, and on the 11th he died.

The fourth case was admitted on 14.2.1918 with illness of ten days duration, no fever, but diarrhoea, five motions on the 19th. He passed blood and mucus and blood clots. On the 20th he collapsed, was comatosed, had incontinence of faeces. Two pints of saline in axilla did not improve his condition 80 c.c. of antidysenteric serum was given on the same date, but with no improvement. On the 21.2.19 he was restless and died. This case was of a very severe type and the serum had not been given early enough to be of any use.

From our experience we are of the opinion that polyvalent antidysenteric serum is reliable and efficacious. The treatment of bacillary dysentery by this method is simple, harmless and very effective. The antidysenteric serum in 60 or 80 c.c. doses should be given early in every severe case. Dietetic and medicinal/

medicinal treatment should not be neglected when the antidysenteric serum is being given to the patient. The saline treatment may be kept up with advantage as long as it is required. In all our cases antidysenteric serum was given subcutaneously. We have no experience of it by intravenous method.

### Amoebic Dysentery.

Emetine hydrochloride is regarded as a specific for dysentery cases of the amoebic type. Our cases were of mild character and they all responded to emetine given hypodermically. We continue it in doses of 1 gr. daily, until blood disappears and faeces begins to turn yellow. It generally suffices to give the drug for a week or so. With rest in bed and dietetic treatment all of our amoebic cases cleared up, under emetine treatment we had very few cases of relapses.

A few of our cases were of mixed bacillary and amoebic infection. They responded to antidysenteric serum plus emetine treatment. We have had very little experience of treatment of amoebic cases with Emetine Bismuth Iodide. Two cases with cysts of amoeba in the stools were treated with Emetine Bismuth Iodide for 8 days. The drug was given in 3 grs. doses daily for  
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a week and apparently with good results. The patients did not like the drug and became weak and depressed.

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C O N C L U S I O N S .

1. Dysentery is one of the most important diseases in the field.
2. Its incidence in the field shows seasonal variation and it assumes epidemic form in certain seasons only.
3. Water and flies are the two most important factors in the spread of the disease in the field.
4. Type of dysentery most predominant in the field was bacillary and it was caused mainly by Shiga's & Flexner Y Bacilli.
5. Laboratory methods are indispensable for the diagnosis and recognition of true nature of the disease in the field.
6. Polyvalent antidysenteric serum is of great value in the treatment of severe cases of bacillary dysentery. Given early in the disease it is most effective. It saves life and effects quicker and complete recovery. It should be given in 60-80 c.c. doses repeated as indicated.

c/o  
Grindlay & Co.,  
BOMBAY.  
8.3.22.

D.H. Rai Major,  
Indian Medical Service.

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